

CLAIMS

1. A substrate processing apparatus, comprising:
a substrate holder capable of holding plural substrates;
a processing chamber which houses the substrates held by the substrate holder;
heating means for heating the processing chamber; and
gas supplying means for supplying processing gas to the processing chamber heated by the heating means, thereby processing the substrate,
wherein the substrate holder includes:
at least three support columns provided substantially vertically;
plural substrate mounting portions which mount the plural substrates substantially horizontally at a predetermined interval, the substrate mounting portions being provided at multi-stages on the support columns; and
plural ring-like plates arranged on the support columns, and provided substantially horizontally at a predetermined interval with respect to the substrates supported on the substrate mounting portions.
2. The substrate processing apparatus according to claim 1, wherein the substrate mounting portions are columnar or approximately semi-columnar in cross section.
3. The substrate processing apparatus according to claim 2, wherein the substrate mounting portions are inclined downward toward an inside of the ring-like plates in a diameter direction.
4. The substrate processing apparatus according to claim 1, wherein inner circumferential surfaces of the ring-like plates, the inner circumferential surfaces being opposite to the support columns, are notched on a periphery of the support

columns.

5. The substrate processing apparatus according to claim 4, wherein the substrate mounting portions are columnar or approximately semi-columnar in cross section.

6. The substrate processing apparatus according to claim 5, wherein tips of the substrate mounting portions are rounded or chamfered.

7. The substrate processing apparatus according to claim 6, wherein the substrate mounting portions are inclined downward toward an inside of the ring-like plates in a diameter direction.

8. The substrate processing apparatus according to claim 4, wherein the support columns are composed into an approximately semi-columnar shape in cross section, and the substrate mounting portions are protruded on a chord side of the support columns.

9. The substrate processing apparatus according to claim 8, wherein, on the chord side, an inside thereof in a diameter direction of the ring-like plates is scooped out.

10. The substrate processing apparatus according to claim 4, wherein the support columns are provided more inside than outer circumferences of the ring-like plates.

11. A substrate processing apparatus, comprising:
a substrate holder capable of holding plural substrates;
a processing chamber which houses the substrates held by the substrate holder;
heating means for heating the processing chamber; and
gas supplying means for supplying processing gas to the processing chamber heated by the heating means, thereby processing the substrate,

wherein the substrate holder includes:

at least three support columns provided substantially vertically; and

plural ring-like plates which surround the at least three support columns, are provided at multi-stages on the support columns, and are provided substantially horizontally at a predetermined interval with respect to the substrates held by the substrate holder, and

inner circumferential surfaces of the ring-like plates, the inner circumferential surfaces being opposite to the support columns, are notched on a periphery of the support columns.

12. The substrate processing apparatus according to claim 11, wherein the support columns are composed into an approximately semi-columnar shape in cross section, and the substrate mounting portions are protruded on a chord side of the support columns.

13. The substrate processing apparatus according to claim 11, wherein the support columns are provided more inside than outer circumferences of the ring-like plates.

14. The substrate processing apparatus according to claim 12, wherein, on the chord side, an inside thereof in a diameter direction of the ring-like plates is scooped out.

15. A substrate holder capable of holding plural substrates, comprising:

at least three support columns provided substantially vertically;

plural substrate mounting portions which mount the plural substrates substantially horizontally at a predetermined interval, the substrate mounting portions being provided at multi-stages on the support columns; and

plural ring-like plates arranged on the support columns,

and provided substantially horizontally at a predetermined interval with respect to the substrates supported on the substrate mounting portions.

16. The substrate holder according to claim 15, wherein inner circumferential surfaces of the ring-like plates, the inner circumferential surfaces being opposite to the support columns, are notched on a periphery of the support columns.

17. A substrate holder capable of holding plural substrates, comprising:

at least three support columns provided substantially vertically; and

plural ring-like plates which surround the at least three support columns, are provided at multi-stages on the support columns, and are provided substantially horizontally at a predetermined interval with respect to the substrates held by the substrate holder,

wherein inner circumferential surfaces of the ring-like plates, the inner circumferential surfaces being opposite to the support columns, are notched on a periphery of the support columns.

18. A method of manufacturing a semiconductor device, the method using a substrate processing apparatus including: a substrate holder capable of holding plural substrates; a processing chamber which houses the substrates held by the substrate holder; heating means for heating the processing chamber; and gas supplying means for supplying processing gas to the processing chamber heated by the heating means, thereby processing the substrate, in which the substrate holder includes: at least three support columns provided substantially vertically; plural substrate mounting portions which mount the plural substrates substantially horizontally at a

predetermined interval, the substrate mounting portions being provided at multi-stages on the support columns; and plural ring-like plates arranged on the support columns, and provided substantially horizontally at a predetermined interval with respect to the substrates supported on the substrate mounting portions, the method comprising the steps of:

mounting the substrates on the substrate mounting portions of the substrate holder;

carrying the substrates mounted on the substrate mounting portions of the substrate holder into the processing chamber;

heating the processing chamber by the heating means; and

supplying the processing gas to the heated processing chamber, thereby processing the substrate.